

Radiation Investigation in Town of Pines, Indiana

Conducted on October 21 – 26, 2012

Larry Jensen

Instrumentation

Scaler/Rate meter, Ludlum Model 2221 (S/N 20234)

2x2 Sodium Iodide Scintillometer, Ludlum Model 44-10 (S/N PR 263806 [A&A #3])

Rented from Auxier & Associates

Calibration

Calibration sheets below.

Calibrated with Cesium-137 with a primary emission energy of 661 kiloelectron volts (keV).

Surveillance Protocol

All natural environments contain radioactive materials, predominantly those in the Uranium-238 Decay Series, the Uranium-235 Decay Series, the Thorium-232 Decay Series and the single radionuclide Potassium-40. Gamma rays emitted from these natural environments are detectable by their emitted gamma-rays with a sodium iodide scintillometer.

Detections per time can be measured in counts per minute, with no distinction of specific isotopes (gross count rates). Surveillance of a natural environment requires measurements of count rates in areas deemed unaffected by contaminants (background count rates). Gross count rate measurements in affected areas can then be compared to count rates in background environments so as to enumerate count rate contributions solely from contaminants.

Results Summary

Eight sites in the Town of Pines showed radiation levels that were statistically different from levels for the natural environment. The average background over 4 sites was 4584 counts per minute (cpm). Measurements above 9168 cpm are statistically different from background. Those investigation sites that are statistically distinct from background are:

Exemption 6	11,255 cpm
South of posts for Pines Park, north of Highway 20	12,718
Pines Town Hall	11,280
Pines Town Hall	12,108
Exemption 6	13,139
E. Johns Avenue, Illinois to Idaho	12,742
Illinois Avenue from E. Johns Avenue to Railroad Avenue	12,760
Exemption 6	12,442

Background Measurements

Four background measurements were taken in the grassy area between the Chicago South Shore and South Bend Railroad tracks and the Calumet Trail adjoining the Town of Pines. These were spread over an east-west line approximately the breadth of the Town of Pines.

Measurement sites were chosen in what appeared to be natural environments unaffected by black, glittery, material, possibly coal combustion byproduct (CCB) bottom ash. In the PINES 2009 radiation survey all elevated count rates were associated with this black, glittery, material. Because it was possible that this material was a contaminant, background measurements for this 2012 survey were not made where this material was seen.

At each background site, the scintillometer was positioned vertically, touching the ground. Counts were for 2 minutes each. Three counts were taken at each site and averaged to give a site background count rate. The overall background count rate for the survey was taken to be the average of measurements for the four background sites.

Lakeshore County Road (500 E) and Calumet Trail

Thursday, October 25, 2012

Surveyor: Larry Jensen

Approximately 27 feet east of trail gate, approximately 13 feet south of trail center

2 minute counts: 9368, 9500, 9219 counts

Resulting count rates: 4684, 4750, 4610 counts per minute (cpm)

Average count rate: 4681 cpm

Highway 520 and Highway 12 intersection, near Calumet Trail

Thursday, October 25, 2012

Surveyor: Larry Jensen

Approximately 40 feet south of trail, approximately 12 feet east of unnamed road

2 minute counts: 8946, 9103, 8824 counts

Resulting count rates: 4473, 4552, 4412 cpm

Average count rate: 4479 cpm

Central Avenue and Calumet Trail

Thursday, October 25, 2012

Surveyor: Larry Jensen

Top of rise, west of Central Avenue, south of Calumet Trail, when looking north from the top of the rise the post marked "1/2" is about as far to one side as the stop sign is to the other.

2 minute counts: 8976, 8832, 8943 counts

Resulting count rates: 4488, 4416, 4472 cpm

Average count rate: 4459 cpm

Carolina Avenue and Calumet Trail

Monday, October 22, 2012

Surveyor: Larry Jensen

South of Calumet Trail, west of Carolina Avenue

2 minute counts: 9441, 9436, 9411 counts

Resulting count rates: 4721, 4718, 4706 cpm

Average count rate: 4715 cpm

Overall average count rate: 4584 cpm

Distinct from Background Protocol

When the site count rate exceeds twice the background count rate the site count rate is deemed to be statistically distinct from background levels. Twice background is 9168 cpm.

Survey Sites

Surveys at a measurement site were made by walking parallel transects with the scintillometer vertically, approximately 3 inches off the ground. Count rates were observed on the scintillometer LCD readout to establish an approximate range for the site. When specific count rates were needed to establish the value at a useful or critical location, a 2 minute count was taken as with background measurements (scintillometer positioned vertically, touching the ground). Site count rates were taken at what appeared to be the peak level for the site.

Exemption 6

Monday, October 22, 2012

Surveyor: Larry Jensen

Range: approximately 3800 – 6500 cpm

Highest count rates were near the storage shed in the rear lot and near the *Exemption 6* easement.

Exemption 6

Monday, October 22, 2012

Surveyor: Larry Jensen

Almost all count rates fell in the range 4000 – 5000 cpm. Exceptions were approximately 7500 cpm around the flower bed, approximately 5500 – 6000 cpm near *Exemption 6* easement.

Exemption 6

Monday, October 22, 2012

Surveyor: Larry Jensen

Most of the property was in the range of 4000 – 5000 cpm. Exceptions were the driveway where the count rate rose to approximately 12,000 cpm.

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Most of the property was in the range of 4000 – 5000 cpm, exceptions were small areas in front of the porch and along the east property line where count rates reached approximately 7000 cpm.

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Most of the property was in the range of 4000 – 5000 cpm. Exception was along the south property line which measured approximately 6000 cpm.

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Highest count rates were along the north fence and the northeast fence corner. Levels near the
Exemption 6 were 4000 – 5000 cpm

Peak measurement: 2 minute count: 22,510 counts

Resulting count rate: 11,255 cpm

Exemption 6

Wednesday, October 24, 2012

Surveyors: Larry Jensen, Paul Kysel

Gravel road to tower on north of property, 2500 – 4300 cpm (measurements on both sides of road)

East – west lines just south of gravel road, 4000 – 4500 cpm

Playground: 3800 – 6800 cpm, higher measurements toward Birch Street, 3500 – 4500 cpm over playground wood chips.

Peak in area east of Pines Park sign, approximately 6500 cpm

East-West transects south of Pines Park sign to wooden posts near Highway 20, 3800 – 6400 cpm

East-West transects further south of Pines Park sign, 4000 – 5000 cpm

Between posts on south side of park and Highway 20: peak to approximately 11,000 cpm

2 minute count between posts and Highway 20, 6 posts east from Hawthorn tree and approximately 15 feet south of posts: 25,436 counts

Resulting count rate: 12,718 cpm.

2 minute count under center of Pines Park sign: 9252 counts

Resulting count rate: 4626 cpm.

Exemption 6

Wednesday, October 24, 2012

Surveyors: Larry Jensen, Paul Kysel

North-south transects at western edge of property: 5500-6500 cpm

Blacktop driveway, contact, approximately 6000 cpm

Front yard, east of driveway: 4500-5500 cpm

East side of house: 4500-5500 cpm

Backyard: 4500-5500 cpm

Bricks near shed in rear of property: 7500 – 8500 cpm on contact (not deemed site contamination)

Pines Town Hall

Wednesday, October 24, 2012

Surveyors: Larry Jensen, Paul Kysel

Wood post closest to Town Hall on west side: approximately 7000 cpm

Near Town Hall foundation, west side: 7500 – 8900 cpm

Area to south, near Town Hall: peak approximately 7000 cpm

Area to east, near Town Hall: 7000 – 8000 cpm

Area to north, near Town Hall: peak approximately 7000 cpm

2 minute count, 12 inches from west side of Town Hall, 10 feet from door: 16,725 counts

Resulting count rate: 8363 cpm.

East edge of playground area, approximately half way between north and south edges: approximately 10,000 cpm.;

Playground area range: 5000 – 10,500 cpm

West edge of playground, range: 5000 – 7500 cpm

2 minute count, monitor well on west side of property, 2 feet east of well: 15602 counts

Resulting count rate: 7801 cpm

2 minute count, east edge of playground, approximately 15 feet from yellow ring jungle gym apparatus: 17864 counts

Resulting count rate: 8932 cpm

2 minute count, 2 feet west of picnic pad, at 2nd post from south: 19200 counts

Resulting count rate: 9600 cpm

Pines Town Hall

Wednesday, October 24, 2012

Surveyor: Larry Jensen

Grassy area north of parking lot, overall: 5000 – 12000 cpm

South half: 10,000 – 12,000 cpm
North half: 5000 – 7000 cpm

2 minute count, 12 feet north from blacktop, opposite west Town Hall window: 22559 counts
Resulting count rate: 11,280 cpm

2 minute count, 15 feet west of Delaware Street, 10 feet north of largest tree: 24216 counts
Resulting count rate: 12,108 cpm

West and south of old town hall (Everett Whitey Wardean Park), range 5000 – 12,000 cpm
Mostly 10,000 – 12,000 cpm

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Range over property: 4000 – 5000 cpm

Contact with brick on house: approximately 8500 cpm (not deemed site contamination)

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Fence line on south side of 2nd Place: 6000 – 8500 cpm, higher near apparent old gate

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Road perimeter, each side: 4000 – 5000 cpm

Along California, including fence area: peak approximately 7500 cpm

Driveway peak: approximately 7500 cpm

Retaining wall on south side of house, range, contact: 8500 – 9000 cpm

Overall property: 4000 – 5000 cpm

Some elevation on contact with house brick (not deemed site contamination)

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Yard on east side near neighbor's drive: approximately 6000 cpm

Trees along front yard: approximately 6000 cpm

West yard: approximately 5000 cpm

Apparent east-west line back from 2nd Place: approximately 6000 cpm

House brick: approximately 10,000 cpm (not deemed site contamination)

Exemption 6

Tuesday, October 23, 2012

Surveyors: Larry Jensen, Paul Kysel

Overall range: 4000 – 5000 cpm

Bricks in backyard near screen porch are somewhat elevated (not deemed site contamination)

Exemption 6

Wednesday, October 24, 2012

Surveyors: Larry Jensen, Paul Kysel

Around tower: 4000 – 5000 cpm

Wednesday, October 24, 2012

Surveyor: Larry Jensen

Overall range: 6000 – 7000 cpm

Peak at gravel part of driveway at Colorado: approximately 9000 cpm

Exemption 6

Wednesday, October 24, 2012

Surveyors: Larry Jensen, Paul Kysel

Front yard along 2nd Place, range: 4500 – 8500 cpm

mostly 4500 – 6000 cpm

approximately 8900 cpm at west edge of driveway

West yard, between gravel drive and home, range: 4000 – 5000 cpm

Limestone on house: approximately 6500 cpm

Backyard, between house and rear pond, range: 3500 – 5000 cpm, 2500 cpm in wet area west of pond

Intersection of Fern and Alabama, undeveloped street

Wednesday, October 24, 2012

Surveyor: Larry Jensen

Range: 5500 – 9000 cpm

Exemption 6

Wednesday, October 24, 2012

Surveyor: Larry Jensen

Approximately 7500 cpm south of gate on 2nd Place

North of gate to blacktop south of Highway 12: 6500 – 13,000 cpm

2 minute count, exposed black glittery material south of above blacktop: 26,277 counts

Resulting count rate: 13,139 cpm

Exemption 6

Wednesday, October 24, 2012

Surveyor: Larry Jensen

Overall range: 4500 – 8300 cpm

Peak at southern driveway: approximately 8300 cpm

E. Johns Avenue, Illinois to Idaho

Wednesday, October 24, 2012

Surveyor: Larry Jensen

North side of street, range: 6200 – 11,000 cpm

South side of street, range: 8400 – 12,600 cpm

2 minute count, south side of street: 25,484 counts

Resulting count rate: 12,742 cpm

Exemption 6

Wednesday, October 24, 2012

Surveyor: Larry Jensen, George Adey

Overall range: 3800 – 5800 cpm

Undeveloped alley behind 4082 Highway 12, from Birch to Ash

Wednesday, October 24, 2012

Surveyor: Larry Jensen, George Adey

Overall range: 2900 - 8400 cpm

Illinois Avenue from E. Johns Avenue to Railroad Avenue

Wednesday, October 24, 2012

Surveyor: Larry Jensen, George Adey

Range: 4100 – 13,000 cpm, highest near Railroad Avenue

2 minute count, approximately 1/3 distance north from Railroad Avenue to E. Johns Avenue:
25519 counts

Resulting count rate: 12,760 cpm

Easement across from Pines Bible Church, north side of Highway 12

Thursday, October 25, 2012

Surveyor: Larry Jensen

Range: 5400 – 6100 cpm

Exemption 6

Thursday, October 25, 2012

Surveyor: Larry Jensen

Range: 3100 – 6700 cpm, higher measurements near driveway

Exemption 6

Friday, October 26, 2012

Surveyor: Larry Jensen

2 minute count, center of driveway, approximately 6 feet from edge of blacktop: 24884 counts
Resulting count rate: 12,442 cpm



GRIFFIN INSTRUMENTS



CALIBRATION CERTIFICATE FOR

2221

SERIAL#

202349

Owner: AUXIER

DATE: 09/10/12

LOCATION:

Griffin Inst

TECH: Joanne Glenn

DATE LAST CAL EXPIRES:

09/08/12

Reason For Calibration:

☒ Due For Calibration

☐ Repair (See Remarks)

☐ Other (See Remarks)

☐ Due and Repair (See Remarks)

NIST TRACEABLE EQUIPMENT USED DURING CALIBRATION

MODEL: 500-2

SERIAL #: 284951

CAL. DUE: 12/28/12

MODEL:

SERIAL #:

CAL DUE:

☒ Fast/Slow Switch working properly

☒ Audio Response

☒ Geotropism

CABLE LENGTH 39"

CONDITION:

Sat

AF MECHANICAL ZERO:

0

AL MECHANICAL ZERO:

0

NEW BATTERIES:

☐ Yes

☒ No

BATT. CHECK >4.8V:

5.8 V

HV (+/-10%)

AS FOUND HV

AS LEFT HV

600 V:

609

600

1200 V:

1220

1200

1800 V:

1836

1789

AF INPUT SENSITIVITY (mV):

33

AL INPUT SENSITIVITY (mV):

35

RATE METER

SCALER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100	100	0.0%	A.F.					
	250	250	0.0%	A.F.					
	400	400	0.0%	A.F.					
x1 or x10	1000	1000	0.0%	A.F.					
	2500	2500	0.0%	A.F.					
	4000	4000	0.0%	A.F.					
x10 or x100	10K	10	K	0.0%	A.F.				
	25K	25	K	0.0%	A.F.				
	40K	40	K	0.0%	A.F.				
x100 or x1000	100K	100	K	0.0%	A.F.				
	250K	250	K	0.0%	A.F.				
	400K	400	K	0.0%	A.F.				

Is the As Found Data Within 20% of the Set Point?:

☒ Yes

☐ No

LOG SCALE

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR
Log	200	200	0.0%	A.F.	
	2000	2000	0.0%	A.F.	
	20K	20	K	0.0%	A.F.
	200K	200	K	0.0%	A.F.

Is the As Found Data Within 20% of the Set Point?:

☒ Yes

☐ No



GRIFFIN INSTRUMENTS



SERIAL # 202349
09/10/12

Audio Divide: ☒ Sat ☐ Unsat

Push Buttons: ☒ Sat ☐ Unsat

Lamp: ☒ Sat ☐ Unsat

Scaler/Digital: ☒ Sat ☐ Unsat

Remarks: Replaced HV and THR buttons

Does Instrument Meet Final Acceptance Criteria?: ☒ Yes ☐ No

Calibration Sticker Attached?: ☒ Yes ☐ No

Date Instrument is Due For Next Calibration: 09/10/13

INSTRUMENT MARRIED WITH

#

Performed/Reviewed by: Joanne Glenn

Date: 9/10/2012

Entered by: JP Initials